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ABSTRACT

The 135 hour course is the terminus of the series of radio and television service courses. The basic course includes a study of color signal demodulation and matrix circuits, the color-picture tube, alignment and trouble shooting of a color television receiver. Laboratory experiments and live production work on color television receivers supplement the related text material. Students learn the required skills and develop closer attention to detail and accuracy along with capacity to judge variations in performance which tend to limit degree of perfection attainable in the color TV picture. The bibliography lists basic and supplementary references, periodicals, and audiovisual aids. Sample posttests conclude the curriculum guide. (MW)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

Course Outline
RADIO AND TELEVISION SERVICE 3 - 9787
(The Color TV)
Department 48 - Quin 9787.04

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1973

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D A D E C O U N T Y P U B L I C S C H O O L S

1 4 5 0 N O R T H E A S T S E C O N D A V E N U E

M I A M I, F L O R I D A 33132

Course Outline

RADIO AND TELEVISION SERVICE 3 - 9787
(The Color TV)

Department 48 - Quin 9787.04

county office of

VOCATIONAL AND ADULT EDUCATION

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Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

June, 1973

Published by the School Board of Dade County

Course Description

9787	48	9787.04	The Color TV
State Category Number	County Dept. Number	County Course Number	Course Title

This is a basic quinmester course which includes a study of color signal demodulation and matrix circuits, the color-picture tube, alignment and trouble shooting of a color television receiver. Laboratory experiements and live production work on color television receivers supplement the related text material. This is a two or three quinmester credit course. The course length is one hundred thirty-five hour.

Indicators of Success:

Prior to entry to this course, the vocational student will display mastery of the skills indicated in the Complete Black and White Television Receiver and Introduction to Color (9787.03)

Clock Hours: 135

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PREFACE

This quinmester course is the terminus of the series of courses in Radio and Television Service. Mastery of the skills in "The Complete Black and White Television Receiver and Introduction to Color" (9787.03) is required for entry into this course.

Students learn to perform the required skills efficiently and accurately. They develop closer attention to detail and accuracy along with capacity to judge variations in performance which tend to limit degree of perfection attainable in the color TV picture.

This outline consists of ten blocks of instruction, which are subdivided into several units each. The course is 135 hours in length.

The quinmester post-test can be used as a means for altering instructional methods or changing course content to accomodate the needs of the students to keep them abreast of changing practices in the television industry.

Instruction is accomplished by means of classroom lessons, textbook assignments, laboratory exercises, identifying trouble symptoms, production work, alignment procedures, color setup practice, trouble shooting, outside reading assignments and written and performance tests.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee, and the Vocational Curriculum Materials Service, and has been approved by the Dade County Vocational Curriculum Committee.

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with Suggested Hourly Breakdown

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BLOCK

I. ORIENTATION (3 Hours)

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Student Responsibilities	1
Student Benefits	1
Introduction to the Text	1

II. COLOR-TV SYSTEM - ITS PRINCIPLES (24 Hours)

Colorimetry - The Science of Determining and Specifying Colors	1
Requirements of the Composite T. V. Signal-Interleaving	1
Make-up of the Color Picture Signal	2
Color Bar Pattern	2
Vector Relationship - Changes in Hue	2

III. COLOR RECEIVER CIRCUITS (12 Hours)

R. F. Circuits	2
Monochrome Circuitry - Luminance Channel	2
Sweep Circuits	2
Low Voltage Supply	2

IV. BANDPASS AMPLIFIER, COLOR SYNC, COLOR KILLER CIRCUITS (15 Hours)

Bandpass Amplifier - Separation of Chrominance Signal	2
Color Synchronization	3
Color Killer Circuits	3

V. COLOR DEMODULATION (15 Hours)

Synchronous Demodulation	3
High Level Demodulation	3
X and Z Demodulation	3

VI. THE MATRIX SECTION (9 Hours)

Matrixing Requirements	3
Practical Application	3
DC Restoration	4

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VII. THE COLOR PICTURE TUBE (18 Hours)
Mechanical Assembly 4
Electrical Characteristics and Requirements 4

VIII. DYNAMIC CONVERGENCE CIRCUITS (6 Hours)
Miconvergence at Extremes of Deflection 4
Convergence Yoke 4
Convergence Circuits 5

IX. COLOR RECEIVER SERVICING (30 Hours)
Setting Up the Receiver 5
Receiver Alignment 5
Troubleshooting Color Receivers 5
The Color TV Antenna 6

X. QUINMESTER POST TEST (3 Hours)

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GOALS

The Color Television Technician must be able to demonstrate:

1. Knowledge of school and classroom rules of procedure, safe handling of tools and equipment, organization and management of the classroom.

2. Understanding of the requisites for filling an entry level job and employment opportunities in his field.

3. Knowledge of color in relation to the human eye and its translation into voltage, bandwidth, vector, luminance, chromaticity relationships by means of diagrams.

4. Recognition of the three types of color demodulation as found in actual receivers and in schematic diagrams, performing adjustments and repairs to these areas of the receiver.

5. Practices used in the repair of troubles found in matrix sections of color receivers.

6. An understanding of the parts of a color picture tube and their interrelation.

7. The ability to perform color purity adjustment, static and dynamic convergence of receivers.

8. The ability to perform all preliminary adjustments followed by final adjustment in customer's homes.

9. Knowledge of the alignment of the tuned circuits and trouble-shooting the problem receiver.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - ORIENTATION

The student must be able to:

1. State what will be expected of him in meeting the standards of the course, taking tests and performance of manipulative operations.
2. Explain policies regarding attendance, safety regulations, shop management.
3. Discuss job opportunities and the qualifications for meeting these opportunities in entry level employment.
4. Demonstrate familiarity with the use of the text by locating topics in the index and use of the glossary.

BLOCK II - COLOR-TV SYSTEM - ITS PRINCIPLES

The student must be able to:

1. Explain colorimetry.
2. Discribe and locate in a text the requirements of the composite color signal.
3. Diagram and describe the composition of the color picture signal.
4. Explain the color bar pattern and demonstrate the use of a color bar generator.
5. Diagram phase relationships, explain reference burst and the color phase diagram.

BLOCK III - COLOR RECEIVER CIRCUITS

The student must be able to:

1. Explain the bandpass requirements of tuner, IF and detector.
2. Trace the monochrome circuitry in the receiver and the schematic diagram.
3. Explain and trace, in the receiver and the schematic diagram, the low voltage power supply and degaussing circuits.

BLOCK IV - BANDPASS AMPLIFIER, COLOR SYNC, COLOR KILLER CIRCUITS

The student must be able to:

1. Explain the function of the bandpass amplifier, tracing it in the receiver and the schematic diagram.
2. Explain the factors effecting color synchronization, tracing the color sync circuits.
3. Explain and trace in the receiver and on the schematic diagram the color killer circuit.

BLOCK V - COLOR DEMODULATION

The student must be able to:

1. Demonstrate an understanding of color demodulation with the use of instruments and diagrams in trouble shooting bugged receivers.
2. Demonstrate an understanding of high level demodulation with the use of instruments and diagrams in trouble shooting bugged receivers.
3. Demonstrate an understanding of X and Z demodulation with the use of insturments and diagrams in trouble shooting bugged receivers.

BLOCK VI - THE MATRIX SECTION

The student must be able to:

1. Explain the requirements for matrixing.
2. Perform trouble shooting assignments in bugged receivers.
3. Explain and diagram DC restoration.

BLOCK VII - THE COLOR PICTURE TUBE

The student must be able to:

1. Locate, diagram, and explain the electronic and geometric features of all parts of the color picture tube and the associated components.
2. Perform adjustments to the several fixed magnets and electromagnets to obtain proper beam convergence of a color picture tube.

BLOCK VIII - DYNAMIC CONVERGENCE CIRCUITS

The student must be able to:

1. Point out the misconvergence of colors on a color picture tube screen and make adjustments to minimize the effect.
2. Explain the operation of convergence coils, locating and explaining the required correction currents.
3. Demonstrate the adjustment of dynamic convergence controls.

BLOCK IX - COLOR RECEIVER SERVICING

The student must be able to:

1. Perform the adjustments required to optimize the picture of a color receiver.
2. Align the tuned circuits in the manner prescribed by the manufacurer of the receiver.
3. Trouble shoot defective receivers, repairing defective black and white and color circuitry, using the instruments of the craft for testing and adjustment. Make necessary repairs skillfully.
4. Analyze and correct troubles in the antenna.

BLOCK X - QUINMESTER POST-TEST

The student must be able to:

1. Satisfactorily complete the quinmester post-test.

Course Outline

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RADIO AND TELEVISION SERVICE - 9787
(The Color TV)

Department 48 - Course 9787.04

I. ORIENTATION

A. Objectives of the Course
   1. Standards
   2. Methods of Evaluation
      a. Paper and pencil tests
      b. Oral tests
      c. Manipulative tests
      d. Job diagnosis and performance
   3. Teaching methods

B. Student Responsibilities
   1. School attendance policy
   2. Safety regulations
   3. Work regulations
      a. Care of hand tools
      b. Use and care of equipment
      c. Materials and supply system
      d. Reporting lost equipment
      e. Reporting inoperative equipment
      f. Housekeeping responsibilities

C. Student Benefits
   1. Opportunities for employment
      a. Scope of the trade
      b. Job Opportunities
   2. Qualifications for employment
      a. Job competency
      b. Attitude
      c. Education and training
      d. Experience

D

D. Introduction to the Text
   1. Discussion of the materials to be covered
   2. Interpretation of author's drawings, charts, schematics

II. COLOR TV SYSTEM - ITS PRINCIPLES

A. Colorimetry - The Science of Determining and Specifying Colors
   1. Light sources
   2. How color appears to the eye
   3. Color specifications

B. Requirements of the Composite Signal - Interleaving
   1. Subcarrier frequency
   2. Divided-carrier modulation
   3. Color synchronization
   4. Chrominance cancellation effect

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C. Make-up of the Color Picture Signal
   1. Luminance signal
   2. Chrominance signal
   3. Bandwidth

D. Color-Bar Pattern
   1. The color bar chart
   2. Scanning the color bars
   3. Formulation of the color difference signal
   4. Formulation of the color picture signal
   5. Relative saturation of color

E. Vector Relationship - Changes in Hue
   1. Phase relationships
   2. Reference burst signal
   3. Color phase diagram

III. COLOR RECEIVER CIRCUITS

A. R. F. Circuits
   1. R. F. Tuner - bandpass requirements
   2. Video IF and Detector - bandpass requirements
   3. Separate sound IF detector

B. Monochrome Circuitry - Luminance Channel
   1. Delay line
   2. Color burst take-off point
   3. Use of traps
   4. Sync take-off point

C. Sweep Circuits
   1. Vertical multivibrator
   2. Pincushion correction
   3. Horizontal oscillator and AFC
   4. Horizontal output and high voltage
   5. High voltage regulator circuits

D. Low Voltage Supply
   1. Power requirements
      a. Rectifiers
      b. Heater strings
      c. Fusing
   2. Degaussing Circuits
      a. Thermistor
      b. Varistor
      c. Degaussing - warm up sequence

IV. BANDPASS AMPLIFIER, COLOR SYNC, COLOR KILLER CIRCUITS

A. Bandpass Amplifier - Separation of Chrominance Signal
   1. Attenuation of 4.5 MHz signal
   2. Blocking of luminance signal
   3. Color burst-color sync
   4. Waveforms

B. Color Synchronization
   1. 3.58 MHz reference oscillator
   2. Color burst signal
   3. Quadrature relationships
   4. Demodulators
   5. I and Q reference signals

C. Color Killer Circuits
   1. Purpose
   2. Black and white reception
   3. Color reception
   4. Threshold

V. COLOR DEMODULATION

A. Synchronous Demodulation
   1. Demodulation of single phase component of quadrature voltage
      a. Tube requirements
      b. I and Q sampling
   2. Phase and amplitude of chrominance signal
   3. Sampling of chrominance signal
      a. Vector relationships of scanned colors
      b. Demodulation with only I and Q signals present
   4. I and Q demodulation Circuits
      a. Demodulators in early receivers
      b. Sheet ream tube demodulators
      c. Diode demodulators
      d. Red, blue, green diode demodulators

B. High Level Demodulation
   1. C-W reference signal
   2. Triode class C demodulator
   3. Two triode demodulator
   4. G-Y signal from common cathode
   5. Phase relationship between reference signals
   6. Correct signals at guns of picture tube
   7. B-Y signal from plate circuits

C. X and Z Demodulation
   1. Tube type
   2. Solid state type

VI. THE MATRIX SECTION

A. Matrixing Requirements
   1. Maximum amplitude for each primary color
   2. Y, I and Q voltage relationships
   3. Color bar pattern waveforms

B. Practical Application
   1. Phase splitter
   2. Cathode follower
   3. X and Z matrixing

C. DC Restoration
   1. Loss of DC voltage levels due to coupling capacitors
   2. DC restoration in grid of Y amplifier

VII. THE COLOR PICTURE TUBE

A. Mechanical Assembly
   1. Phosphor dot screen
      a. Nature of phosphor dots
      b. Arrangement of phosphor dots
   2. Aperture mask
      a. Nature of aperture mask
      b. Necessity for mask
      c. Geometry of aperture mask
   3. Electron gun assembly
      a. Description
      b. Arrangement of guns
      d. Color purity ring

B. Electrical Characteristics and Requirements
   1. Focusing electron beam
   2. Convergence of electron beams
      a. Static convergence
      b. Dynamic convergence
         (1) As deflection angle changes
         (2) Correction by convergence yoke
         (3) Sources of dynamic convergence energy
   3. Effects of stray magnetic fields on picture
      a. Magnetic shield
      b. Degaussing coil
   4. Color Purity
      a. Proper positioning of deflection yoke
      b. Adjustment of purity rings
   5. Convergence and focus voltage supplies
      a. DC focus voltage supplies
      b. Magnetic convergence
   6. Beam positioning magnets
      a. Effect on electron beams
      b. Lateral positioning magnet for blue beam

VIII. DYNAMIC CONVERGENCE CIRCUITS

A. Misconvergence at Extremes of Deflection
   1. Horizontal
   2. Vertical
   3. Requirements for correction of convergence error

B. Convergence Yoke
   1. Currents in convergence coils
   2. Results of application of coil correction currents
   3. Parabolic and sawtooth correction currents

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VIII. DYNAMIC CONVERGENCE CIRCUITS (Contd)

C. Convergence Circuits
1. Vertical convergence
2. Horizontal convergence
3. Blue convergence

IX. COLOR RECEIVER SERVICING

A. Setting Up the Receiver
1. Preliminary adjustments
a. Adjusting high voltage
b. Adjusting black and white picture
c. Horizontal sweep circuit adjustments
d. AGC adjustment
e. Degaussing picture tube and chassis
2. Static convergence
a. The dot-bar generator
b. Selection of dot nearest center of screen
c. Movement of convergence magnets
d. Movement of blue lateral magnet
3. Dynamic convergence
a. Set manufacturer's recommendations
b. Purity adjustments
c. Convergence adjustments in order recommended
d. Black and white tracking adjustments

B. Receiver Alignment
1. Bench arrangement
a. Equipment required for alignment
b. Setting up alignment instruments
c. Making connections to receiver
2. Tuned circuit alignment
a. Bandpass amplifier
b. Color sync section
c. RF and IF alignment
d. Sound IF alignment

C. Troubleshooting Color Receivers
1. Checking monochrome operation
a. Loss of picture
b. Improper BW tracking
c. Hum in monochrome picture
d. Hum in one or more of colors only
e. Use of color bar generator
2. Signal tests
a. RF and IF
b. Color section
c. Signals at demodulators
d. Color detector and color killer
e. Wrong colors
f. Loss of color saturation
g. Loss of color difference signals
h. 3.58 MHz oscillator troubles

3. Effects of tuned circuit misalignment
4. Loss of color sync
5. Convergence troubles
   a. Troubles in picture tube
   b. Defects in convergence yoke
   c. Defects in convergence controls

D. The Color TV's Antenna
1. Ghosts
2. Impedance
3. Defects in Antenna and transmission line

X. QUINMESTER POST TEST

BIBLIOGRAPHY
(The Color TV)

Basic References:

1. Howard W. Sams Editorial Staff, The. Color TV Training Manual. 3rd ed. Indianapolis: Howard W. Sams and Company, 1971. Pp. 283.

2. Tinnell, Richard W. Television Symptom Diagnosis. Indianapolis: Howard W. Sams and Company, 1971. Pp. 168.

3. _____. Television Symptom Diagnosis - Student Response Manual. Indianapolis: Howard W. Sams and Company, 1971. Pp. 221.

Supplementary References:

4. Buchsbaum. Fundamentals of Television. New York: John F. Rider Publisher, Inc., 1964. Pp. 291.

5. Middleton, Robert G. Transistor T. V. Training Course. Indianapolis: Howard W. Sams and Company, 1968. Pp. 126.

6. Zbar, Paul B. Basic Television. 2nd ed. New York: McGraw-Hill, 1968. Pp. 302.

Periodicals:

7. Electronic Servicing. Kansas City. Intertech Publishing Company. Monthly.

8. Electronics World. Flushing City: Ziff-Davis Publishing Company. Monthly.

9. PF Reporter. Minneapolis: Howard W. Sams and Company.

10. Radio-Electronics. Concord: Gernsbach Publications: Monthly.

Films:

	Dade County No.
1. Color and Light: An Introduction. 16 mm.	1-01858
2. Nature of Color, The. 16 mm. 11 min. Color. Sound. Coronet.	1-10738
3. Understanding Color: Color by Addition. 16 mm. 14 min. Color. Sound. Academy.	1-01887

Single Concept Film Loop Series:

4. Television Symptom Diagnosis. Indianapolis: Howard W. Sams and Company. #20840.

Transparencies:

5. Light and Additive Process. 1 Static. An illustration of the production of pastel colors from the three primaries. Drago.

6. Light: The Substrative Process. 1 Static. 3 Overlays. Discs of magenta, Cyan and Yellow demonstrate the substrative process. Drago.

APPENDIX

Quinmester Post-Test Sample

QUINMESTER POST-TEST

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Name _____ Date _____ Score _____

Directions: Each statement needs a word, figure, or phrase to make it correct. Only one of the choices listed is correct. Circle the correct letter.

1. If a small area of red light is placed next to a small area of green light, the color seen by the eye is:

   a. White
   b. Orange
   c. Green
   d. Yellow
   e. Red

2. Which of the following words is a variation of color:

   a. Dilution
   b. Energy
   c. Hue
   d. Light
   e. Brightness

3. The NTSC primary colors are:

   a. Yellow, white, cyan
   b. Red, green, cyan
   c. Red, green, blue
   d. Magenta, green, blue
   e. Green, red, magenta

4. The three NTSC secondary colors are:

   a. Magenta, red, blue
   b. Green, blue, red
   c. Green, cyan, yellow
   d. Cyan, yellow, green
   e. Magenta, cyan, yellow

5. The purpose of the color burst is to:

   a. Produce a fine dot pattern
   b. Provide a phase reference
   c. Provide luminance signal
   d. Provide monochromatic reception
   e. Provide composite signal

6. The composite color signal contains:

   a. Luminance signal
   b. Chrominance signal
   c. Burst signal
   d. Sync. signals
   e. All of the above

7. The frequency of the color burst is:

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   a. 15,750 Hz
   b. 3.58 MHz
   c. 60 Hz
   d. 4.2 MHz
   e. 3.5 MHz

8. The outputs from the tubes of a color camera focused on a gray scene would be:

   a. Green voltage - .5, red voltage - .5, blue voltage - .5
   b. Green voltage - .59, red voltage - .30, blue voltage - .11
   c. Green voltage - .11, red voltage - .59, blue voltage - .30
   d. $E_y = .59\ E_g + .30\ E_r + .11\ E_b$
   e. A and b above

9. The fully saturated color producing the darkest shade of gray on a monochrome TV screen would be:

   a. Red
   b. Magenta
   c. Cyan
   d. Blue
   e. Green

10. One of the following does not enter into the color picture signal:

   a. Chrominance
   b. Burst
   c. Sync
   d. Luminance
   e. Blanking

11. Bandwidth of the luminance signal is:

   a. .5 MHz
   b. 1.5 MHz
   c. 4.5 MHz
   d. 3.58 MHz
   e. 4.2 MHz

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12. The color picture signal is made up of:

    a. Y
    b. I
    c. Q
    d. b and c above
    e. a, b, c above

13. Best flesh tones are obtained by using signals such as:

    a. I
    b. R-Y
    c. Q
    d. B-Y
    e. a and c above

14. Compared with black and white receivers tuners in color receivers must have:

    a. Uniform bandpass characteristics
    b. More channels
    c. Tuneable low channel coils
    d. A and b above
    e. A and c above

15. If the IF bandpass were not sufficiently broad the effect on the color picture would be:

    a. Loss of detail
    b. Loss of color
    c. Poor color
    d. Poor color
    d. None of the above
    e. a, b, and/or c

16. The sound IF carrier in a color receiver must be obtained:

    a. After the video detector
    b. From a point ahead of the video detector
    c. From the sound carrier trap
    d. From the video detector
    e. a and c above

17. The take-off point for the chrominance signal fed to the typical bandpass amplifier is at the:

    a. First video amplifier
    b. Color killer
    c. Burst amplifier
    d. 2nd IF amplifier
    e. Quadrature amplifier

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18. The circuit responsible for preventing appearance of color in a monochrome picture is the:

a. Phase detector
b. Trap
c. Color killer
d. Chroma reference oscillator
e. Hue control

19. Color sync is affected by:

a. Frequency of the reference oscillator
b. Phase of the 3.58 MHz signal
c. Frequency response of the burst amplifier
d. IF alignment
e. All of the above

20. The HUE control affects color by changing:

a. Frequency
b. Amplitude
c. Luminance
d. Demodulation
e. Phase

21. Demodulator circuits for color information must be capable of detecting:

a. Amplitude
b. Phase
c. A and B above
d. None of the above

22. Color demodulators must convert the chrominance signal into:

a. I signal
b. Q signal
c. A and b
d. None of the above

23. Modulation present in the chrominance signal is:

a. Frequency
b. Amplitude
c. A and b above
d. Phase
e. B and d above

24. Changing the phase of the CW reference signal by 180 degrees will produce the following effect at the demodulator outputs:

a. Reversed polarity
b. No signal
c. Saturation
d. None of the above

25. High level demodulation refers to:

a. Demodulation of signal peaks
b. Demodulation of low amplitude signals
c. Amplification before demodulation
d. B and c
e. A and b

26. The 3.58 MHz CW reference signal is removed:

a. Before demodulation
b. At the picture tube only
c. At the video detector
d. At the demodulator input
e. After demodulation

27. When a color picture is fully saturated red the color signals must be:

a. Red 50%, blue 0%, green 50%
b. Red 0%, blue 0%, green 100%
c. Red 100%, blue 0%, green 0%
d. Red 0%, blue 0%, green 0%
e. Red 0%, blue 100%, green 0%

28. When a given portion of a color picture is white the color signals must be:

a. Red 0%, blue 0%, green 0%
b. Red 30%, blue 30%, green 30%
c. Red 100%, blue 100%, green 100%
d. B and c above
e. None of the above

29. The DC restorer serves the purpose of:

a. Reproducing accurate background illumination
b. Recovers DC from power supply
c. Eliminates coupling capacitors
d. None of the above

30. Draw a diagram of the beam color tube, showing positions of the electron guns, aperture mask, triads. Label all parts, indicating their related colors

31. Positioning the beam of each electron gun to land on its own color dot is called:

a. Phasing
b. Convergence
c. Focusing
d. Deflection
e. Degaussing

32. Moving the red beam positioning magnet affects:

a. Red and blue beams
b. Red beam only
c. All beams
d. Red and green beams
e. Changes color purity

33. The type of convergence used on the three color gun picture tube is:

a. Variable
b. Dynamic
c. Fixed
d. Static
e. B and d

34. The three electromagnets positioned adjacent to the gun is:

a. Deflection yoke
b. Focus magnets
c. Convergence yoke
d. Purity rings
e. A and c

35. Dynamic convergence signals are obtained from these circuits:

a. Vertical output
b. Horizontal output
c. AC source
d. A and b above

36. Horizontal convergence voltage waveforms are of the following type:

a. Sawtooth
b. Sinusoidal
c. Square wave
d. Parabolic
e. Trapezoidal

37. Tilt is provided by:

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a. Rotating deflection yoke
b. Sawtooth voltage
c. Amplitude control
d. Parabolic voltage
e. Sine wave

38. List the four components used to obtain static convergence.

39. It is necessary to follow proper procedure in preparing the color TV for adjustment. The preliminary steps are listed below in random sequence. Indicate the proper sequence by placing the appropriate letter next to the number in the proper order.

a. Adjust focus control	1. _____
b. If high voltage variations are excessive, make adjustments	2. _____
c. Adjust horizontal size, linearity and centering	3. _____
d. Adjust ACC for proper, distortionless contact.	4. _____
e. Adjust vertical size, linearity, centering	5. _____
f. Tune in monochrome test signal	6. _____
g. Measure high voltage and adjust if necessary	7. _____
h. Check lock in range of horizontal oscillator	8. _____
i. Adjust brightness and contrast controls for na normal picture	9. _____
j. Rotate brightness control through normal range, not high voltage variation	10. _____

40. Failure of the burst amplifier produces the following effect on the screen of a color receiver:

a. Incorrect hues
b. Loss of color sync
c. No color
d. Desaturated color
e. None of the above

41. If the gain of the bandpass amplifier is low, the effect on the screen of the color receiver is:

a. Low contrast
b. Low saturation of colors
c. Incorrect hue
d. None of the above

42. If the picture loses color the cause is:

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a. Antenna incorrectly oriented
b. Color killer control misadjusted
c. Defective bandpass amplifier
d. Inoperative 3.58 MHz oscillator
e. All of the above

43. Static convergence is adjusted by:

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a. Adjusting the red magnet
b. Rotating purity rings
c. Adjusting red, green and blue magnets
d. All of the above
e. None of the above

44. Dynamic convergence depends on:

a. Adjusting vertical position of raster
b. Adjusting tilt
c. Adjusting amplitude
d. Adjusting drive
e. B and c above

45. The best source of convergence information on a particular color TV is:

a. Textbook
b. Service publications
c. Manufacturers service manuals
d. Customer
e. Another technician

46. Loss of color sync is indicated by:

a. No color
b. Diagnonal stripes of mixed colors
c. Wrong colors
d. Picture drifting horizontally and vertically
e. Colored snow

47. Before aligning any circuit it is necessary to:

a. Turn all controls to minimum
b. Check receiver when cold
c. Check for changed values of parts
d. Turn all controls to maximum
e. None of the above

48. Trouble shooting should always start with:

a. Analysis of picture and sound
b. Checking antenna
c. Checking high voltage
d. Testing tubes
e. Testing transistors

49. If a color picture cannot be adjusted for gray scale, the possible cause is:

    a. Defective picture tube
    b. Improper voltages applied to picture tube elements
    c. Defective color difference amplifiers
    d. All of the above
    e. None of the above

50. List three safety precautions which should be observed in handling any picture tube.

51. Why is it helpful to convergence to make a mark at the exact center of the color tube screen?

52. The proper techniques for lifting heavy items such as receivers of chassis is:

    a. Bend over and lift with the back
    b. Keeping the back erect as possible use the leg muscles for lifting
    c. Ask someone to assist in lifting very heavy objects
    d. None of the above
    e. B and c

53. Stored picture tubes should always:

    a. Be placed on the floor or table
    b. Be left uncovered
    c. Be placed on a soft surface
    d. Be covered with a furniture pad or placed in a box
    e. C and d above

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PERFORMANCE TEST: COLOR PURITY & B/W TRACKING ADJUSTMENT

NOTES TO EXAMINER

1. Prepare work stations prior to arrival of students. At each station arrange following in uniform and orderly manner.

   A. Color receiver in good operating condition, color purity out of adjustment. Back of set off, cheater cord connected to power and set warmed up minimum of ten minutes.

   B. Degaussing coil with extension cord.

   C. Service mirror and stand.

   D. Excelite SM 99 tool kit.

   E. Grease pencil or crayon. Appropriate straight edge to measure and mark center of picture tube face.

2. Instruct student to read directions carefully. Ask appropriate questions to make sure that he understands what to do.

3. Direct student to begin work and record time on score chart.

4. As student works, execute, with as little interference as possible, the appropriate check list. Observe deftness of manipulation and sureness of decisions as well as results of each step on the picture tube screen. Score up to 20 points per step for quality.

5. Score ten points per step for the student's closeness to prescribed procedure.

6. If the student requires correction at any point, instruct him as to the proper procedure at that point but no credit is allowed for steps requiring assistance.

7. Record time of completion and calculate elapsed time.

8. Tally the student's score and percentage.

PERFORMANCE TEST

Adjusting Color Purity and Black and White Tracking

Before performing any of the following steps check the color television receiver for normal operation. If operational defects are found they must be corrected before any color purity adjustments are made. If no defects are found proceed. Remove the video signal by pulling the Y amplifier tube or transistor or unplugging the I. E. input cable from the tuner or pulling an I. F. tube or transistor. Adjust brightness level to normal intensity. Mark the exact center of the picture tube face before beginning with following steps. Degausse the picture tube and surrounding area. Dim room lights or pull down window shades to put the room in semi darkness. Low ambient light level makes it possible to judge raster color more accurately. The receiver must be warmed up for ten minutes. Now proceed with the adjustmens listed below.

1. Loosen deflection yoke mounting and pull yoke back close to convergence yoke.

2. With green and blue screen controls turned to minimum adjust red screen control for normal brightness.

3. Adjust purity rings so that red area of raster is centered around mark on picture tube face.

4. Move deflection yoke forward until raster is pure red over entire screen area.

5. Remove vertical sweep with setup switch and check to see that the line is level. If not level rotate yoke to make line level. Restore vertical sweep. Check red purity before going to next step. Tighten yoke mounting.

6. Reduce red screen to minimum, advance green screen to maximum. Check green purity, return control to minimum position.

7. Advance blue screen to maximum, check blue purity. Return control to minimum position. (If green or blue screens are impure repeat procedure.)

8. Move setup switch to setup position. Advance red screen control to medium brightness.

9. Advance green and blue screen controls in turn until colors blend to produce a white line. If guns are not accurately converged, two or more lines may be seen; if so, estimate brightness needed to produce white line when combined.

10. Return setup switch to normal position and inspect raster. If overall purity is good, but a slight cast of blue or green remains reduce screen control setting for that color until raster is overall white or neutral gray.

PERFORMANCE TEST: COLOR PURITY & B/W TRACKING ADJUSTMENT

NAME _____ DATE _____ SCORE _____

Possible Score:

Time 100 Procedure 100 Quality 200 General Competence 100

A. To the Student:

1. Read these directions carefully. Study the attached information sheet which gives directions for the job you are to perform. Obtain from your instructor an explanation of all instructions which are not clear to you. Your insturctor will tell you when to start work.

2. The purpose of this test is to measure how well you can perform the basic operations described in the instruction sheet. In completing these operations you are to follow the procedures demonstrated and taught by your instructor.

3. Possible score. By completing the job in 20 minutes or less, you earn 100 points. For each minute in excess of 20 minutes, 5 points will be deducted. You must stop if you have not finished in 30 minutes.

   The total possible score is 500 points earned as follows:
   Speed - 100 points
   Quality - 200 points
   Procedure - 100 points
   General Competance - 100 points

SCORE CHART

STEP	1	2	3	4	5	6	7	8	9	10	TOTAL
Quality											
Procedure											
Step Points											

Time Stopped _____
Time Started _____
Excess Minutes x 5 = Penalty Points _____
NET TIME POINTS _____

Total Step Points _____
Total Time Points _____
COMPETENCE POINTS _____
SCORE _____

$$\frac{\text{SCORE POINTS}}{500} \times 100 = _____\%$$

ANSWER KEY TO QUINMESTER POST-TEST

1. d
2. c
3. c
4. e
5. b
6. e
7. b
8. a
9. d
10. e
11. e
12. e
13. e
14. e
15. e
16. b
17. b
18. c
19. e
20. e
21. c
22. c
23. e
24. a
25. c
26. e
27. c
28. c
29. a
30. As requested by instructor
31. b
32. b
33. e
34. c
35. d
36. d
37. b
38. 1. red magnet, 2. blue magnet
    3. green magnet, 4. blue lateral
39. 1. f, 2. h, 3. d, 4. i, 5. g, 6. j,
    7. b, 81 c, 9. e, 10.a.
40. c
41. b
42. e
43. d
44. e
45. c
46. b
47. c
48. a
49. d
50. 1. Discharge high voltage, 2. Wear safety goggles, 3. Place on clean soft surface.
51. So that do nearest center will be converged; so that adjustment of red area for color purity will be accurate.
52. e
53. e